

STUDIES ON THE GENUS *APHODIUS* OF THE UNITED
STATES AND CANADA (COLEOPTERA: SCARABAEIDAE):
VI. TWO NEW SAND ASSOCIATED SPECIES
FROM COLORADO AND UTAH

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Abstract.—Horn's Series I-c of *Aphodius* is discussed and a key to the pale, fimbriate members of the Series provided. Two new species are described, *aggregatus* and *perfimbratus*. Both are apparently sand-loving, and both probably feed on detritus in the sand.

Many species in several aphodiine genera are sand-loving, but very few of these are in the genus *Aphodius*. When knowledge of the habits of more species of *Aphodius* is available, this statement may no longer be true, but the only previously described species known definitely to be associated with areas of relatively unstable sand (Atlantic coastal dunes) is *A. phaleroides* Horn. It is perhaps no coincidence that the two new species described here are morphologically similar to *phaleroides*.

Horn (1887) established his series I-c for 11 species of *Aphodius*, including *phaleroides*, and 11 more species have been added by various authors from 1887 to the present. I am assigning both new species to this series because of their apparent relationship to *phaleroides*. The Series I-c is a heterogeneous assemblage of several phyletic lineages, and it is obvious that new groups will have to be established and species reassigned in a subsequent paper. For the present I am modifying Horn's 1887 key to include all of the species of series I-c that are mostly pale yellow and lack clypeal armature. This is possible because *phaleroides* and allies are strikingly pale compared to the rest of the species in the key and are fimbriate with hairs on the pronotal and elytral borders. The following key begins with couplet 7, from page 36 of Horn, 1887; *parvus* Horn is omitted as it has previously been transferred to *Didactylia*, and *aegrotus* Horn has been placed in series I-b by Cartwright (1939) as *geomysi* Cartwright, later treated as a junior synonym of *aegrotus* by Woodruff (1973).

Specimens used in this study are the property of the following institutions (abbreviations for each as used herein are indicated): Canadian National Collection, Ottawa (CNC); H. Howden collection, Carleton University, Ottawa (HH); U.S. National Museum, Washington, D.C. (USNM).

Modified Key to Some Species of Series I-c

- | | |
|--|----------------------|
| 7. Elytral intervals 9 and 10 pubescent | <i>bifrons</i> Bates |
| – Elytral intervals 9 and 10 not pubescent | 8 |

8. Lateral borders of pronotum and elytra fringed with hairs longer than scutellum; basal border of pronotum without marginal line (Fig. 2) *perfimbriatus*, n. sp.
- Lateral borders of pronotum and elytra fringed with hairs shorter than scutellum; basal border of pronotum with marginal line (Fig. 1) 9
9. Discal area of pronotum with median, darkened area; Atlantic Coast *phaleroides* Horn
- Discal area of pronotum immaculate or with elongate, darkened area on each side of middle (Fig. 1); southern Utah *aggregatus*, n. sp.

Aphodius aggregatus Gordon, new species
(Figs. 1, 3, 4)

Holotype.—Male, length 4.38 mm, greatest width 2.00 mm. Form elongate, moderately convex, widest just posterior to middle of elytra (Fig. 1). Color pale brownish yellow except pronotum with 2 nebulous, longitudinal darkened areas on each side of middle; elytron with narrow sutural border dark brown and 2 elongate, nebulous, darkened areas, anterior area on 6th and 7th intervals posterior to humerus, posterior area on 3rd and 4th intervals posterior to middle of elytron. Head shining, lacking frontal tubercles; surface barely perceptibly alutaceous, finely punctate, punctures separated by about the diameter of a puncture; anterior border of clypeus distinctly reflexed, shallowly emarginate medially, anterolateral angle broadly rounded; gena fimbriate with hairs $\frac{1}{2}$ as long as apical segment of maxillary palpus. Pronotum shining, with no apparent surface microsculpture, strongly convex, punctate, punctures coarser than on head, separated by less than $2\times$ the diameter of a puncture; anterolateral angle rounded, lateral border distinctly margined, feebly curved throughout, fimbriate with hairs no longer than scutellum, posterolateral angle abruptly rounded, posterior border slightly sinuate, finely margined, fimbriate with hairs $\frac{1}{2}$ as long as scutellum. Elytra shining, fringed with hairs shorter than scutellum, intervals feebly alutaceous, slightly convex, with fine punctures arranged in 2 irregular rows; striae feebly impressed, punctures widely spaced, nearly invisible. Anterior tibia with outer teeth strong, posterior tooth basad of middle of tibia, apical spur strongly thickened, curved downward at apex; middle and hind tibiae with apex fringed with unequal spines, outer spur $\frac{2}{3}$ length of inner, curved at apex, inner spur longer than 1st tarsal segment, strongly sinuate. Front tarsus with basal segment shorter than segment 2, segments 2-4 subequal, segment 5 nearly as long as segments 2-4 combined; segment 5 equal to segments 3-4. Abdominal sterna distinctly hairy; pygidium triangular, hairy, strongly alutaceous. Genitalia short, robust, slightly flattened dorsoventrally (Figs. 3, 4).

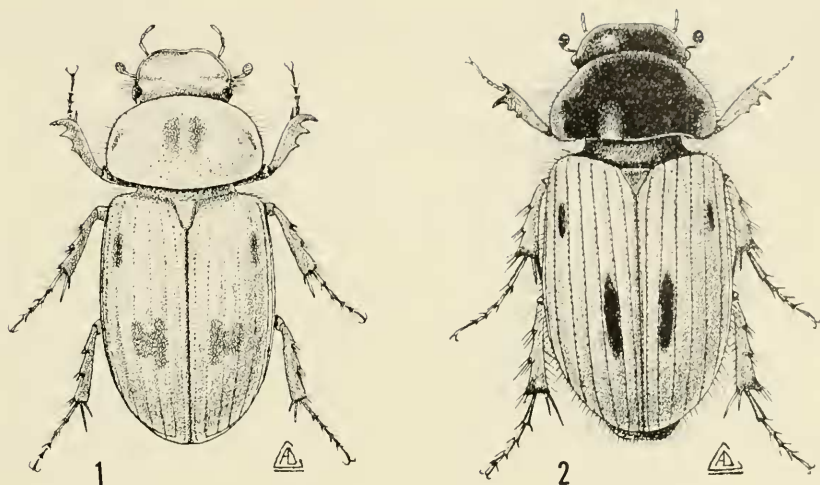


Fig. 1-2. Habitus. 1, *Aphodius aggregatus*. 2, *Aphodius perfimbriatus*.

Type-material.—Holotype, ♂, Utah, 14 mi S Hanksville, Fairview Ranch, 21-VII-1973, Robert Gordon, collected in sand-oak vicinity (USNM 73566). Paratypes, 98 ♂♂, with same data as holotype except: Collected in human dung, VII-9-1968, A. T. Howden; VII-28-1968, VIII-3-1968, VIII-7-9-1968, H. & A. Howden, light, Sand-Oak area. (CNC, HH, USNM).

Variation.—Length ranges from 3.80 to 4.55 mm, width from 1.78 to 2.10 mm. The elytral spots vary from distinct and dark (Fig. 1) to indistinct, pale, reduced areas. The darkened pronotal areas range from distinct to nebulous.

Remarks.—*Aphodius aggregatus* is similar to *phaleroides* but *phaleroides* has the pronotum flattened dorsoventrally with a distinct, elongate, darkened area on the disc; head smooth, nearly impunctate; apical clypeal margin feebly emarginate appearing truncate; and length from 4.00 to 5.60 mm.

The type-locality is a sandy sagebrush desert area, and the specimens were collected along a dry, sandy wash lined with dwarf Gambel's Oak (*Quercus gambeli* Nutt.) ranging from a few inches to 6 feet in height. Approximately half the specimens were taken at human dung during a half hour period just before sunset. The beetles appeared suddenly, swarming over the bait, and just as suddenly disappeared. Other specimens came to black light after dark but no further activity was observed at the dung. All specimens collected are apparently males. Not all have been dissected but those that were are males, and I cannot detect any secondary

sexual dimorphism in the series. The closely related *phaleroides* occurs along the sandy Atlantic Coast beaches from New York to South Carolina. Both of these species are obviously associated with sand and are apparently saprophytic feeders.

Etymology.—The species name is a Latin adjective and refers to the aggregation of specimens observed at human dung.

Aphodius perfimbriatus Gordon, new species
(Figs. 2, 5, 6)

Holotype.—Male, length 4.60 mm, greatest width 2.25 mm. Form elongate, widest posterior to middle of elytra (Fig. 2). Color mostly pale yellow; head dark brown except apical and lateral borders slightly paler; pronotum dark brown medially, pale yellow laterally with median dark spot; elytron pale yellow with narrow sutural border dark brown and 2 small, dark-brown spots, anterior spot obliquely longitudinal on 6th and 7th intervals at basal $\frac{1}{3}$, posterior spot longitudinal on 3rd and 4th intervals just posterior to middle; ventral surface pale yellow except meso- and metasternum and abdomen dark brown. Head smooth, shining, entirely lacking frontal tubercles; surface feebly alutaceous except on vertex, finely punctate, punctures separated by less than to $3\times$ the diameter of a puncture; anterior border slightly reflexed, barely perceptible, emarginate medially, anterolateral angle broadly rounded; gena fimbriate with hairs as long as apical segment of maxillary palpus. Pronotum smooth, shining, with indistinct system of dual punctures, fine punctures separated by 2 to $4\times$ the diameter of a puncture, large punctures widely spaced, irregularly scattered throughout; anterolateral angle rounded, lateral border finely margined, straight, fimbriate with hairs longer than scutellum, posterolateral angle broadly rounded, posterior border sinuate, lacking margin, fimbriate with hairs shorter than scutellum. Elytron shining, intervals feebly alutaceous, slightly convex, with very fine, irregularly scattered punctures; striae feebly impressed, finely, indistinctly punctured, lateral border fimbriate with long hairs. Anterior tibia with outer teeth strong, posterior tooth basad of middle of tibia, apical spur short, laterally flattened, curved downward at apex; middle and hind tibiae with apex fringed with unequal spines, outer spur $\frac{2}{3}$ length of inner, slightly curved, apex acute, inner spur longer than 1st tarsal segment, strongly sinuate, apex acute. Front tarsus with basal segment shorter than segment 2, segments 2–4 subequal, segment 5 nearly as long as segments 2–4 combined; middle and hind tarsi with basal segment nearly as long as 2 and 3 combined, segments 2–4 subequal, segment 5 $1\frac{1}{2}\times$ as long as 4th. Abdominal sterna with long, semierect setae; pygidium triangular, with dense, long setae, setae particularly long on apical border. Genitalia long, slender, dorsoventrally flattened (Figs. 5, 6).

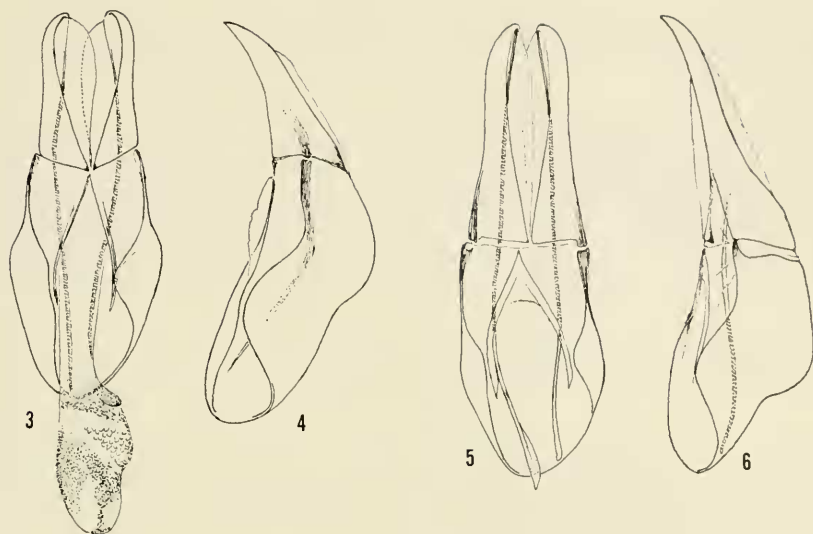


Fig. 3-6. Male genitalia. 3-4, *Aphodius aggregatus*, ventral and lateral views. 5-6, *Aphodius perfimbriatus*, ventral and lateral views.

Allotype.—Female, length 4.52 mm, greatest width 2.31 mm. Similar to male except pronotum narrower, more convex; anterior tibial spur slightly more slender and elongate.

Type-material.—Holotype, ♂, Colorado, Sand Dunes National Monument near Alamosa, 17-VII-1973, Robert Gordon (USNM 73567). Allotype female and 25 paratypes (14 ♂♂, 11 ♀♀) with same data. (CNC, HH, USNM).

Variation.—Length ranges from 3.80 to 4.60 mm, width from 1.98 to 2.31 mm. The dark elytral spots vary slightly in size and shape; the posterior spot may extend onto the 2nd interval and the anterior spot may be entirely lacking. Well-marked individuals have a faint dark spot on the 3rd and 4th intervals on the apical declivity of the elytron. The head often has pale circular areas on the front where the lateral tubercles would be if present, and the anterior border of the pronotum is also often pale.

Remarks.—Placement of this species in the existing classification is difficult because it possesses characteristics of both Series I-c and Group L. Horn's key to Groups (1887) separates Groups I and L on the basis of the presence or absence of elytral pubescence, a character which has no phyletic significance in this instance. Group L is reasonably homogeneous but Series I-c is made up of at least 3 distinct lineages. *Aphodius perfimbriatus* keys to Series I-c because it lacks elytral pubescence, and I provisionally place it there pending a complete reorganization of that Series. *Aphodius perfim-*

briatus most nearly resembles *phaleroides* and *aggregatus* from both of which it may be separated by the extremely long hairs on the elytral and pronotal margins.

All type-specimens were collected at black light at the edge of the dunes in Sand Dunes National Monument. The flight period began immediately after sunset and lasted about an hour. I believe *perfimbrriatus*, as *phaleroides* and *aggregatus*, is associated with sand and is a saprophytic feeder. The color patterns of all three species, including the position of the darkened dorsal areas are extremely similar. I regard this as an independent adaptation to the habitat.

Etymology.—The species name is a Latin adjective and refers to the fringe of long hairs on the pronotum and elytra.

Literature Cited

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EDITOR'S NOTE

The reader of this issue will notice the use of a new style in the layout of articles. We are now using a larger print size in the body of each article as well as more type/page. We hope that this will make the articles easier to read. This format should be less expensive to the Society and thus should allow for larger issues of the *Proceedings*. The Editor will be pleased to have your comments.